U.S. Department of Education
Federal Student Aid

Federal Student Aid Technology Standards and Products Guide

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Document Version Control

Version	Date	Description
1.0	November 2, 2001	Provided general updates under TO 55.
2.0	January 25, 2002	Reformatted document to align with the Department of Education Policy document and updated document to reflect new standards and products.
2.1	February 12, 2002	Updated document with client feedback. Renamed document title.
2.2	March 29, 2002	Included updates from 1/15/2002 to 3/15/2002 in Federal Student Aid standards, products, and policies. Added an Application Development section.
2.3	June 30, 2002	Incorporated planned ITA upgrades, added an executive summary, added Mobile Devices to Network Services section, added External Connections to External Environment section, and updated several version numbers.
3.0	September 27, 2002	Updated to include minor version number changes and other architectural changes. Reflects all updates through revision date.
3.1	April 1, 2003	Updated to include minor version number changes and other architectural changes. Reflects all updates through revision date.
4.0	August 1, 2003	Updated to include minor version number changes and other architectural changes. Reflects all updates through revision date.
4.1	August 2004	Updated to include minor version number changes and other architectural changes. Reflects all updates through revision date. Replaced Consistent Data with Data Strategy section. Reflects all updates through revision date.
4.2	May 2005	Introduced the Metadata management category, added products to be provided with ADvance and CSB contracts.
5.0	December 2005	Populated the Metadata management category. Revised and added the software for ADvance and CSB contracts. Removed the Data Strategy section and all references to it. Updated the EDM text as well as Data Modeling. Removed the minimum PC Specifications and all references to it. Added a new Appendix A – Reusable Common Services (RCS) and Portlets. Reflects all updates through revision date.
5.1	February 2006	Added "FileNet" as the Document Management Standard. Changed "WebSphere Application Server 6.0" to "WebSphere Process Server 6.0".
5.2	June 2006	Updated DRM information, updated web sites, added in Common Operating Environment (COE) Diagrams, updated language.
6.0	July 2007	Document renamed to Technology Standards and Products Guide and re-organized to facilitate architecture understanding, re-categorized products and standards to align with FEA TRM. Removed version numbers from product listing to facilitate maintenance. Evergreen process will provide the current version of products in the environment.

Version	Date	Description
6.1	June 2008	Added the following to Table 3-2, "Service Access and Delivery Channels": Documentum eRoom, BMC Control Cron, Flash, and Cisco PIX VPN. Changed text in IP Version from IPv4 to IP v6.
		Added the following to Table 3-3, "component Framework": Clickcommerce (Formerly BTRADE), Siebel Analytics, WebFocus, WebTrends, Verisign, SiteScope,CA UniCenter, Oracle Enterprise Manager and , WBI Monitor. Added IIS information analyzer, Data stage, quality stage, and xml registry and repository.
		Added following to Table 3-4, "Service Interface and Integration Standards": System Architect, Informatica and updated the link to Design Principles of ESB Architectural model and Application Architectural Model (Pg. 28), added Embarcadero ER/Studio
		Deleted the following from Table 3-4: Websphere Datapower XML Accelerator XA 35.
		In Table 3-5: Removed Websphere Business Modeler. Added the following "Service Platforms and Infrastructure": FileNet, Interwoven Teamsite, IBM Workplace Web Content Management (WCM), IBM Websphere Integration Developer, IBM Rational Application Developer, IBM Rational Systems Architect, Mainfarme Z Series, 990, HP, Sun, JProbe, Microsoft Office, WinZip, IBM Rational Test Manager,, Performance Testing, and Unit Testing, added "Data standardization" under the service standard, Modeling.
		In section 2.3.7, replaced the Operating system Open VMS with Z/OS. Added 'WCM' to Appendix A.
		Deleted all intranet links in the document to void broken links.
6.2	September 2008	Deleted entire section on Infornation Technology Architecture
		Added Architecture Overview as a reference in Section 1.5
		Added mystartingline.ed.gov in Table 2-2 as an intranet service standard
		In Table 2-2, changed the intranet service standard, "The Starting Line" from Federal Student Aid Standard to Federal Student Aid contained
		Added HP Portfolio and Project management in Table 2-2
		Deleted CWM in Table 2-3. Added link for XMI.
		Added Websphere Service Registry and Repository in Table 2-4
		Renamed IBM Portal factory in Table 2-5 to IBM Portlet factory
		Added Rational Software Modeler in Table 2-5
		Added text on Architecture overview in Section 2, "Service Specifications"

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Executive Summary

The Federal Student Aid Technology Standards and Products Guide (Guide) provides an organized, systematic way of classifying Federal Student Aid's information technology infrastructure and provides a basis for understanding the basic principles, assumptions, and rules governing the development of Federal Student Aid information technology policies.

This Guide focuses on services that maintain a reliable and secure environment. It highlights the Service access and delivery channels, component framework, Service interface and integration standards and service platforms and infrastructure. This Guide establishes standard, by enterprise area, specify how the currently approved architecture helps Federal Student Aid achieve an optimum degree of order and consistency in the environment.

The Guide also explains how Federal Student Aid's enterprise is organized from a technical perspective, distinguishing "infrastructure" from "applications," and provides a high level framework against which enterprise solutions are delivered. Each technology is categorized by established guidelines according to the Federal Enterprise Architecture (FEA) Technical Reference Model (TRM) standards.

This Guide further augments FEA TRM classifications with a Federal Student Aid Classification scheme to help architects identify preferred products and standards. The scheme identifies the governing body and status of a technology or standard in the architecture as follows:

- **Government Standard** - Standards mandated and maintained by the Federal Government.

- **ED Standard** - General use specification maintained at the Department level or accepted de-facto within a given segment (i.e., Network standards).

- **Federal Student Aid Standard** - The technologies and products that have been approved for enterprise business use and are supported in the environment. These standards include **Federal Student Aid Target Standards** that facilitate the alignment of all new applications to the Target State Vision.

- **Federal Student Aid Contained** - Technologies/Products approved in the architecture for specific business needs (not to be expanded by investment beyond the need). These can be further defined as **Legacy** products that were in use prior to the establishment of the component-based architecture and **Administrative/Internal Use Only**, which are suitable for internal development and administrative use only.

Adoption of enterprise-wide standards promotes interoperability, scalability, and enables cost effective acquisition and development of systems and applications to meet Federal Student Aid's business needs. This Guide is intended to promote a smooth transition from current to future technologies, but it does not attempt to provide a prioritized, scheduled transition plan for moving toward a desired future state.

This Guide contains embedded hyperlinks to publicly available websites and footnotes that contain documents referenced on Federal Student Aid's Intranet web site. Documents referenced that are only available via Federal Student Aid's Intranet website can be requested directly from Federal Student Aid. All references and hyperlinks are listed in Appendix C.

Section 1. Introduction

1.1   Purpose

This Guide is a reference tool for Federal Student Aid architects, business stakeholders, project managers, system administrators, application developers, procurement personnel, and others who require guidance on implementing Federal Student Aid technology standards and standard products.

The Federal Student Aid Technology Standards and Products Guide's primary purpose is to enable architects to identify opportunities to leverage technology, alleviate redundancy, and highlight where technology-overlap limits the value of IT investments.

This Guide addresses the fundamental technologies comprising the infrastructure, and it focuses on standards and products that promote managed services within a reliable and secure environment. This Guide is a critical component in a comprehensive effort to align government-wide investments in information technology with the needs of Federal Student Aid.

This Guide is not intended as a comprehensive list of products in use within Federal Student Aid. Rather, it is the set of identifiable current and target distributed component architecture standards, along with a minimum set of legacy standards and Intranet standards to differentiate current and future technology standards and preferred products.

1.2   Scope

This Guide is for the use by all personnel, including contractors, who are responsible for or involved in the development of Federal Student Aid's general support systems and major applications. This Guide is intended to assist them in determining and applying the relevant standards to systems and applications.

This Guide sets out the standards by which the IT infrastructure is designed and/or operated and lists the technologies and products that promote transition from the current technical architecture to the envisioned technical architecture as described in the Federal Student Aid Target State Vision.

Federal Student Aid uses the Federal Enterprise Architecture (FEA) Reference Models as the basis for the Technology Standards and Products Guide. This Guide's classification scheme is based on the Technical Reference Model (TRM), which is a component-driven, technical framework that identifies the standards and specifications that comprise a service component.

Federal Student Aid leverages the FEA to describe its technical environment, and to accomplish its goals in implementing the Federal Student Aid mission. Further details of the use of the TRM and the other FEA Reference Models can be obtained via the Federal Enterprise Architecture website.

1.3   Intended Audience

The table below lists the intended users for the Federal Student Aid Technology Standards and Products Guide, the document sections most relevant for each type of user, and the purpose for which the users may use the information in this Guide.

Table 1-1 Intended Audience and Document Usage

Users	Relevant Sections	Uses
Federal Student Aid Executives / Federal Student Aid Business Owners & CIO Staff	Executive Summary Sections 1, 2	Facilitates and communicates an organized, systematic way of classifying the information technology infrastructure
Federal Student Aid Architects	All	Facilitates understanding of Federal Student Aid's technology infrastructure and promotes reuse by identification of preferred products and standards
Potential Vendors	All	Communicates the technology infrastructure and identifies standards, and technologies that support the construction, delivery, and exchange of Federal Student Aid business and application components

1.4   Document Organization

This Guide is comprised of the following sections:

- **Section 1. Introduction** - This section addresses the purpose, scope, audience, document organization and related references.

- **Section 2. Service Specifications** – This section profiles the preferred technologies and standards used to support Federal Student Aid Service Components classified by the Federal Enterprise Architecture guidelines.

- **Appendix A: Acronyms** - This appendix lists the acronyms and definitions used throughout the document.

- **Appendix B: Glossary** - This appendix provides key terms and definitions used throughout the document.

- **Appendix C** - Bibliography

1.5   References and Related Documents

The Federal Student Aid's Technology Standards and Products Guide was developed to support Federal Student Aid's business operations in compliance with the laws, regulations, and guidance listed below:

- **Clinger-Cohen Act of 1996:** Requires agencies to implement IT management processes, integrate management and budget processes, inventory IT investments, and designate a Chief Information Officer

- **OMB Circular A-11:** Requires agencies to submit plans and progress on their enterprise architectures

- **OMB Circular A-130:** Requires that Federal agencies create Enterprise Architecture and update OMB as significant changes are made

- **Paperwork Reduction Act of 1995:** Requires Federal agencies to be more responsible and publicly accountable for reducing the burden of Federal paperwork

- **The Government Paperwork Elimination Act (GPEA):** Requires agencies to leverage improved network technologies by improving electronic transactions

- **The E-Government Act of 2002** (P.L. 107-347): Requires agencies to support e-Government projects and to leverage cross-agency initiatives to further e-Government. It also requires agencies to submit privacy impact assessments for all new IT investments using personally identifiable data from or about members of the public

- **The Federal Records Act of 1950:** Requires Federal agencies to establish and maintain a continuing program for the economical and efficient management of agency records. Electronic records created or received by the Federal Government must be managed as Federal records

- **Government Performance Results Act of 1993:** Requires that Federal agencies accurately employ performance metrics to measure and report performance results related to IT investments

- The Federal Chief Information Officer Council **Federal Transition Framework:** Provides a single information source for cross-agency information technology initiatives

This Guide's classification scheme is based on the FEA Technical Reference Model (TRM), which is a component-driven, technical framework that identifies the standards and specifications that comprise a service component. The TRM describes how a component is accessed, built, deployed, and maintained.

The following documents were also used as reference material for this release:

- Department of Education Enterprise Standards and Guidelines, February 2007

- Department of Education Enterprise Data Standards and Guidelines

- Federal Student Aid Technology Standards and Products Guide (prior versions)

- CIO Technology Handbook

- Federal Student Aid Business Case Reviews for Select Phase (FY07)

- ITA Current State Reports (Multiple for CY07)

- EAI Current State Reports (Multiple for CY07)

- ITA Application State Assessment October 2006

- EAI Application State Assessment October 2006

- Security Architecture (SA) Application State Assessment October 2006

- Architecture Overview version # 1.5

Section 2. Service Specifications

Applications hosted in the Virtual Data Center (VDC) share the same hardware, products and support to facilitate re-use and provide cost savings to Federal Student Aid business owners. All Federal Student Aid distributed applications use either IBM HTTP Server and/or WebSphere Application Server.

The objective of defining service specifications is to identify and classify standards and technologies that support the construction, delivery, and exchange of Federal Student Aid business and application components (Service Components), according to FEA guidelines, at a level of abstraction that allow principles and rules to be developed and/or followed without being confused by physical implementation details. The architecture at Federal Student Aid is outlined in the, Architecture Overview version 1.5. It outlines the Infrastructure Services, Systems Management and Architecture.

The following graphic depicts the major technologies and standards that support Federal Student Aid Service Components. Target State Vision technologies are identified in red.
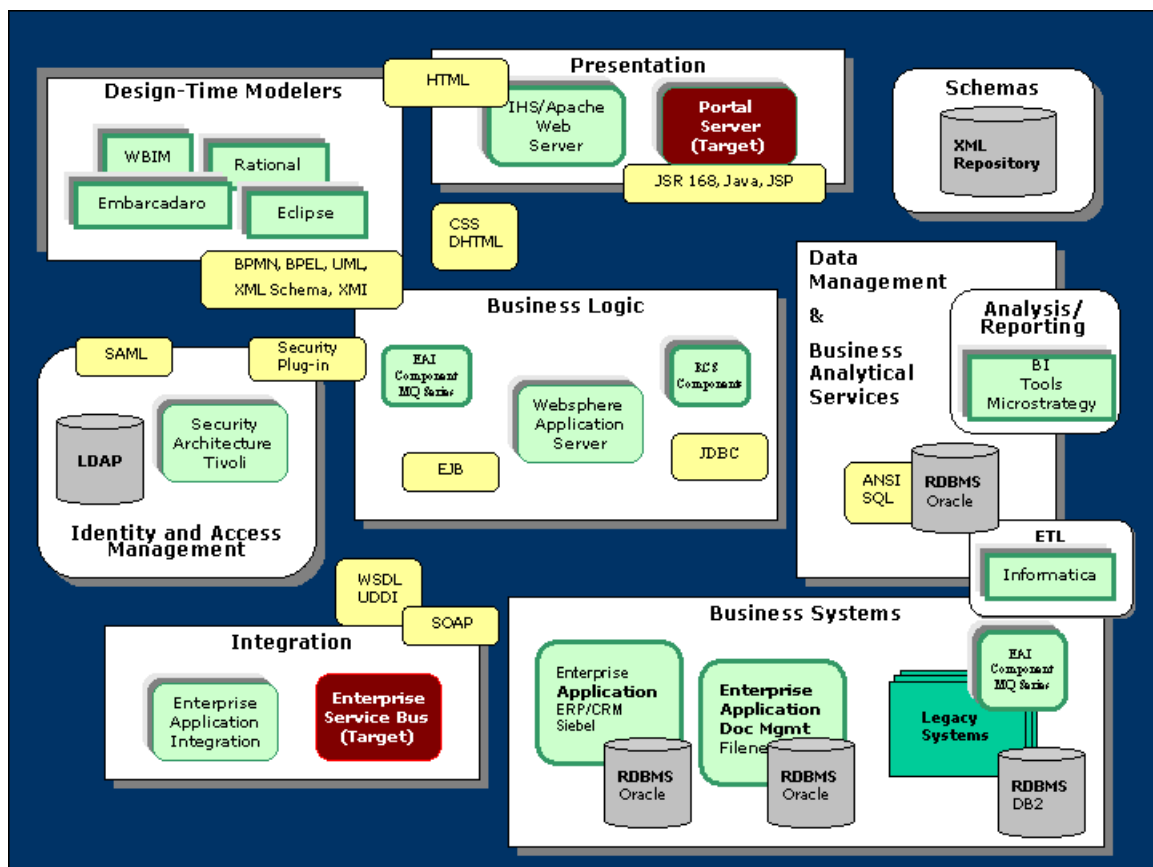

Figure 2-1 High-Level Federal Student Aid Technology Stack

Federal Student Aid chose to augment FEA TRM classifications with a Standards Classification scheme to help architects identify preferred products and standards. The

scheme identifies the governing body and status of a technology or standard in the architecture as follows:

Table 2-1 Federal Student Aid Product Classification

Service Specification	Federal Student Aid Classification	Description
Standard that Federal Student Aid uses to identify standards and technologies in use within the environment	Government standard mandated	Standards mandated and maintained by the Federal Government.
	ED - Department of Education Standard	Standards maintained at the Department level or a General Use specification accepted as De-Facto within a given segment (i.e., TCP/IP).
	Federal Student Aid Standard Product or Target Standard	Suitable for new application development for Federal Student Aid.
	Federal Student Aid Contained	Technologies/Products approved in the architecture for a specific business need, without expanding the use of the standard to the entire enterprise. Includes legacy systems and products used for administrative and Internal use.

2.1   Service Access and Delivery Channels

Service access and delivery channels for Federal Student Aid handle all application communication with web, terminal or mobile clients, invoking business logic and transmitting data in response to incoming requests. The services in this tier provide a usable interactive interface between clients and enterprise applications as defined below:

- **Access Channels** define the interface between an application and its users, whether it is a browser, personal digital assistant, or other medium.

  Federal Student Aid uses thin client technology (web browsers) to serve as the access channel to its external facing applications. Currently the Federal Student Aid standard requires applications to support the following browsers:

  o   Internet Explorer

  While Federal Student Aid will continue to use thin client technology for client access, **web services** are emerging as a target technology within Federal Student Aid.

- **Delivery channels** define the level of access to applications and systems based upon the type of network used to deliver them.

  Federal Student Aid uses the public Internet for delivering financial aid to citizens and has an extranet capability to collaborate with colleges, business partners and guarantee agencies.

- **Service Requirements** define the necessary aspects to include legislative, performance and hosting.
- **Service Transport** defines the end-to-end management of the communications session to include the access and delivery protocols.

Table 2-2 Service Access and Delivery Channels

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
Access Channel	Web Browser	Internet Explorer	ED Standard	Federal Student Aid is delivered via the public Internet
	Collaboration /Communications The Service Specification represents the main channels for collaborating with Federal Student Aid	Student Aid Internet Gateway (SAIG)	Federal Student Aid Standard (Technologies may be Contained)	SAIG uses ClickCommerce Inc. EAClient TDClient TDCommunityManager TDConnector API TDManager
		FSA Gateway	Federal Student Aid Target	
		Postsecondary Education Participants System Web site	Federal Student Aid Standard (Technologies may be Contained)	Citrix Metaframe Access 3.0 (PEPS external)
		Integrated Partner Management (IPM)	Federal Student Aid Target	
		Documentum eRoom	ED Standard	
		BMC Control Cron	Federal Student Aid Contained	Scheduler
		Flash	Federal Student Aid Contained	Application for internal collaboration

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
		HP Portfolio and Project Management with CPIC Accelerator module	Federal Student Aid Standard	Integrated tool used for Portfolio and Project management and Enterprise Operational Change management
Delivery Channel	Internet	Federal Student Aid Gateway Students Channel School Eligibility Channel Financial Partners Portal	Federal Student Aid Standard	While there are several channels the Service Specification represents the main delivery channel via the public Internet Students Channel: http://studentaid.ed.gov/ Schools Eligibility Channel: http://fsa4schools.ed.gov/ Financial Partners Portal: http://www.fp.ed.gov
		Enterprise Portal	Federal Student Aid Target	
	Intranet	The Starting Line (Currently being phased out)	Federal Student Aid Contained	Federal Student Aid makes use of an Intranet for Federal Student Aid employee communications
		Mystartingline. ed.gov	Federal Student Aid Standard	Federal Student Aid is migrating towards this portal for employee communications
	Extranet	Student Aid Internet Gateway (SAIG)	Federal Student Aid Standard	SAIG is a private network that uses the Internet protocol and the public telecommunication system to securely share business information with Postsecondary schools, lenders, and guarantors
	Virtual Private Network (VPN)	F5 Networks Firepass, Cisco PIX VPN	Federal Student Aid Standard	
Service Requirements	Hosting	Virtual Data Center (VDC)	Federal Student Aid Standard	

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
	Legislative / Compliance	Federal Laws and Regulations including Section 508 Guidelines	Government Standard	Federal Student Aid follows OMB Policies and Federal Laws and Regulations for Federal Agency Public Websites which can be accessed at http://www.usa.gov/webcontent/ Web pages must also be accessible to people using assistive technologies such as screen readers. "Web-based Intranet and Internet Information and Applications" (http://www.access-board.gov/sec508/guide/1194.22.htm) details the provisions required for a web page to be considered accessible.
		Federal Student Aid Style guide	Federal Student Aid Standard	The Federal Student Aid Style Guide is required for developing print and online material with the Federal Student Aid brand identity. The guide is located on theStartingLine.
	Security	Standards for Information Processing	Government Standard	Under the Information Technology Management Reform Act (Public Law 104-106), the Secretary of Commerce approves standards and guidelines that are developed by the National Institute of Standards and Technology (NIST) for Federal computer systems. These standards and guidelines are issued by NIST as Federal Information Processing Standards (FIPS) and Special Publications for use government-wide. http://csrc.nist.gov/publications/fips/index.html http://csrc.nist.gov/publications/nistpubs/index.html

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
		Security Configuration Guidelines	Federal Student Aid Standard	Online Security Center
		Security Configuration Checklist		
Service Transport	Service Transport	Hyper Text Transfer Protocol (HTTP)/1.1	ED Standard	http://www.w3.org/Protocols/
		Hyper Text Transfer Protocol Secure (HTTPS)	ED Standard	
		Internet Protocol (IP) Version 4 (IPv4)	ED Standard	
		Internet Protocol (IP) Version 6 (IPv6)	ED Target Standard	http://www.ipv6.org/
	Supporting Network Services	Domain Name System (DNS)	ED Standard	
		IBM Tivoli Directory Server	Federal Student Aid Standard	LDAPv3 Specification - Lightweight Directory Access Protocol (LDAP) v3
		Microsoft Exchange 2000	ED Standard	Internet Message Access Protocol / Post Office Protocol (IMAP / POP3)

2.2   Component Framework

The Component Framework defines the underlying foundation and technical building blocks by which Federal Student Aid's Service Components are built. Target application components are built based on a server-side component model using technologies aligned with the Federal Student Aid Enterprise Architecture and are categorized as:

- **Business Logic** - Defines the software, protocol or method by which business rules are enforced within applications.

- **Data Interchange** - Defines the methods by which data is transferred and represented in and between software applications.

- **Data Management** – Defines the management of all data/information including data administration, standards for defining data and the way in which people perceive and use it.

- **Presentation / Interface** - Defines the connection between the user and the software, consisting of the presentation that is physically represented on the screen.

- **Security** - Defines the methods of protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction to provide integrity, confidentiality and availability.

The server-side component model simplifies development, allows for transactional integrity, and provides for a portable and scalable architecture. Components built using this model simplify client access to data while encapsulating communications and implementation details.

The components developed interface with the mainframe transaction processing systems, which provide the critical information infrastructure for the Aid delivery business processes. These services also interface with back-end data services that provide registration, authentication, and entitlement services.

Table 2-3 Component Framework

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
Business Logic	Platform Dependent	C-Sharp (C#) VB Script Visual Basic Visual Basic .Net (VB.Net)	Federal Student Aid Contained	

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
	Platform Independent	Enterprise Java Beans (EJB) Service Component Architecture Specification	Federal Student Aid Standard	http://java.sun.com/ See also: Design principles detailed in the ESB Architectural Model and Application Architectural Model documents
		C, C++ Cobol Fortran	Federal Student Aid Contained	Legacy Business Systems
Data Interchange	Data Exchange	Electronic Business using XML (ebXML)	Federal Student Aid Standard	http://www.ebxml.org/
		Simple Object Access Protocol (SOAP)	Federal Student Aid Target	http://www.w3.org/TR/soap/
		XMI	Federal Student Aid Target	Various Data Exchange standards (i.e. XMI) are under consideration by the Enterprise Data Management Group and will be incorporated into future revisions pending outcome of EDM decisions. See http://www.omg.org for information concerning the standards. See http://en.wikipedia.org/wiki/XMI for additional information on XMI
		Click Commerce (Formerly BTRADE)	Federal Student Aid Standard	
Data Management	Database Connectivity	Java Database Connectivity (JDBC)	Federal Student Aid Standard	
		DB2 Connector	Federal Student Aid Contained	

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
		Active Data Objects (ADO) Active Data Objects .NET (ADO.NET) Open Database Connectivity (ODBC)	Federal Student Aid Contained	
	Reporting and Analysis	WebFocus	Federal Student Aid Standard	
		MicroStrategy 8 Platform MicroStrategy Intelligence Server MicroStrategy Narrowcast Server	Federal Student Aid Contained	http://www.microstrategy.com/ Online Analytical Processing (OLAP) Decision Support and Data Mart System
		Siebel Analytics	Federal Student Aid Contained	
		WebTrends	Federal Student Aid Standard	Web Statistical Analysis
	Data Quality	IIS Information Analyzer, Quality Stage	Federal Student Aid Standard	
		Data Stage	Federal Student Aid Standard	Data Cleansing
	Data Standardization (Metadata)	XML Registry and Repository	Federal Student Aid Standard	Enterprise Data Dictionary and Enterprise Conceptual Data Model
Presentation / Interface	Content Rendering	Cascading Style Sheets (CSS)	Federal Student Aid Standard	http://www.w3.org/Style/CSS/

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
		JavaScript	Federal Student Aid Standard	
		eXtensible HTML (XHTML)	Federal Student Aid Standard	The W3C's recommendation for the next generation of HTML leveraging XML http://www.w3.org/TR/2001/REC-xhtml11-20010531/
		Dynamic HTML (DHTML)	Federal Student Aid Standard	
	Dynamic / Server-Side Display	Java Server Pages (JSP) Java Portlet API (JSR 168) Java Servlet (JSR 53) Adobe Forms IBM Forms	Federal Student Aid Standard	
		Active Server Pages (ASP) Active Server Pages .Net (ASP.Net) Oracle Forms (FMS)	Federal Student Aid Contained	
	Static Display	Hyper Text Markup Language (HTML)	Federal Student Aid Standard	The language used to create Web documents http://www.w3.org/TR/html4/
Security	Certificates / Digital Signature	Secure Sockets Layer (SSL), Verisign	Federal Student Aid Standard	

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
	Supporting Security Services	Web Services Security (WS-Security) WS-Trust v1.3 Security Assertion Markup Language (SAML) v2.0 WS-SecureConversation v1.3 WS-ReliableMessaging 1.1	Federal Student Aid Target	http://www.oasis-open.org/specs/index.php - wssv1.1
		Monitoring Services SiteScope	Federal Student Aid Contained	Web site Monitor
		CA Unicenter	Federal Student Aid Standard	File system and Process Monitoring
		Oracle Enterprise Manager	Federal Student Aid Contained	Managing Database health, capacity, compliance and vulnerability
		WBI Monitor	Federal Student Aid Standard	Service Monitoring
		IBM Tivoli Identity Manager	Federal Student Aid Standard	Service Monitoring
		IBM Tivoli Access Manager		Application Server Monitoring

2.3   Service Interface and Integration Standards

The system interface and integration services tier provides an additional service layer that supports existing technologies and allows access to application functionality via web services and messaging subsystems. Presentation logic as well as vendor and agency back-office systems are allowed secure access to use these services.

- **Integration** - Defines the software services enabling elements of distributed business applications to interoperate. These elements can share function, content, and communications across heterogeneous computing environments. In particular, service integration offers a set of architecture services such as platform and service location transparency, transaction management, basic messaging between two points, and guaranteed message delivery.

- **Interface** - Defines the capabilities of communicating, transporting and exchanging information through a common dialog or method. Delivery Channels provide the information to reach the intended destination, whereas Interfaces allow the interaction to occur based on a predetermined framework.

- **Interoperability** - Defines the capabilities of discovering and sharing data and services across disparate systems and vendors.

Table 2-4 Service Interface and Integration Standards

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
Integration	Enterprise Application Integration	IBM Websphere Adapters	Federal Student Aid Standard	Application Connectivity
		IBM Websphere Process Server: WebSphere DataPower SOA Appliances WebSphere DataPower Integration Appliance XI50	Federal Student Aid Target	Business Process Management Business Process Execution Language (BPEL) Service Component Architecture (SCA) WebSphere DataPower SOA Appliance
		Informatica	Federal Student Aid Contained	Extract, Transform and Load (ETL)

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
		IBM Information Server	Federal Student Aid Standard	
	Middleware	IBM Websphere MQ	Federal Student Aid Standard	IBM WebSphere MQ is a network communication technology launched by IBM in March 1992. It was previously known as MQSeries, which is a trademark that was rebranded by IBM in 2002 to join the suite of WebSphere products. WebSphere MQ is IBM's Message Oriented Middleware offering.
		ANSI SQL	Federal Student Aid Standard	SQL (Structured Query Language) has been standardized by both ANSI and ISO
		Commerce Quest DI	Federal Student Aid Contained	
		IBM Websphere Message Broker	Federal Student Aid contained	
Interface	Service Description / Interface	IBM WebSphere DataPower XML Security Gateway XS40 Web Services Description Language (WSDL)	Federal Student Aid Target	
	Service Discovery	Universal Description, Discovery, and Integration (UDDI)	Federal Student Aid Target	

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
		Websphere Service Registry and Repository	Federal Student Aid Target	Managing Enterprise Services
Interoperability	Data Format / Classification	eXtensible Markup Language (XML)	ED Standard	http://www.w3.org/XML/
		Namespaces	ED Standard	http://www.w3.org/TR/REC-xml-names/
		ISO/IEC 11179 XML Registry and Repository for the Education Community	ED Standard	The Core Components stored in the XML Registry and Repository have been created and reviewed through a collaborative effort between the Office of Federal Student Aid (FSA), Postsecondary Electronics Standards Council (PESC), and the Education Standards Community.
		System Architect	Federal Student Aid Standard	EA Repository
		Embarcadero ER/ Studio	Federal Student Aid Standard	This is used for EDD, ECDM and Data model registration.
	Data Transformation	eXtensible Stylesheet Language Transform (XSLT)	Federal Student Aid Standard	http://www.w3.org/Style/XSL/
	Data Types / Validation	XML Schema	Federal Student Aid Standard	http://www.w3.org/TR/REC-xml/

2.4   Service Platforms and Infrastructure

The Service Platform and Infrastructure defines the collection of platforms, hardware and infrastructure specifications that enable Federal Student Aid to develop component-based architectures and facilitate component reuse. Platform and Application servers will reduce the complexity of developing components by providing automatic support for services such as transactions, security and database connectivity.

- Database / Storage - Collection of programs that enables storage, modification, and extraction of information from a database, and various techniques and devices for storing large amounts of data

- Delivery Servers - Front-end platforms that provide information to a requesting application and includes the hardware, operating system, server software, and networking protocols

- Hardware / Infrastructure - Physical devices, facilities and standards that provide the computing and networking environment within and between enterprises

- Software Engineering - Technical skills and project management processes such as testing, modeling and versioning used to develop software systems,

- Supporting Platforms - Hardware or software architectures. The term originally dealt with only hardware, and it is still used to refer to a CPU model or computer family.

The service platform and infrastructure also includes the collection of relational and legacy database systems, enterprise resource planning (ERP) systems, and mainframe transaction processing systems that provide the critical information infrastructure for Federal Student Aid's business processes. These varied systems hold the information that Federal Student Aid needs to carry out its daily operations. It is essential that new applications developed for Federal Student Aid are able to integrate with these enterprise information systems.

Table 2-5 Service Platforms and Infrastructure

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
Database/ Storage	Database	IBM Database 2 (DB2)	Federal Student Aid Contained	Legacy
		Informix	Federal Student Aid Contained	Legacy
		Oracle	Federal Student Aid Standard	Business Systems

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
		SQL Server	Federal Student Aid Contained	Intranet Only
Delivery Servers	Application Servers	IBM Websphere Application Server	Federal Student Aid Standard	
		FileNet	Federal Student Aid Standard	Document Management
		Interwoven, Teamsite	Federal Student Aid Contained	Content Management
		IBM Workplace Web Content Management (WCM)	Federal Student Aid Standard	Content Management
	Portal Servers	IBM Websphere Portal Sever / IBM Websphere Portlet Factory	Federal Student Aid Target	
	Web Servers	IBM IHS Webserver	Federal Student Aid Standard	
Hardware / Infrastructure	Network Devices / Standards / Peripherals / Servers / Computers	Standards set by contractual requirements / Mainframe Z Series, 990, HP, Sun	LAN/Network - ED Standard / Servers/Computers - Federal Student Aid Standard	See Integrated Technology Architecture / Enterprise Application Integration and the Virtual Data Center for current product listing for infrastructure hardware.
Software Engineering	Integrated Development Environment (IDE)	Visual Studio Visual Studio.Net	Federal Student Aid Contained	
		IBM WebSphere Studio	Federal Student Aid Standard	
		IBM Websphere Integration Developer	Federal Student Aid Target	

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
		IBM Rational Application Developer	Federal Student Aid Target	
		Eclipse	Federal Student Aid Standard	http://www.eclipse.org/
		JProbe	Federal Student Aid Contained	Java Profiling tool
	Modeling	Unified Modeling Language (UML) v2.0	Federal Student Aid Target	http://www.uml.org/
		Business Process Execution Language (BPEL) v2.0	Federal Student Aid Target	BPEL Specification 2.0
		Business Process Modeling Notation (BPMN) v1.0	Federal Student Aid Target	http://www.bpmn.org/
		Federal Student Aid Data Model Standards and Guidelines, Data Standardization and Registration Policies and Procedures Information Engineering (IE) Notation	Federal Student Aid Standard	Enterprise Data Modeling Standards and notation Data Model Standards are part of the Acquisition Package(s)
		IBM Rational Rose	Federal Student Aid Standard	Application behavior & design tool
		IBM Rational Systems Architect	Federal Student Aid Target	
		Embarcadero E/R Studio	Federal Student Aid Standard	Enterprise Data Modeling Tool
		Rational Software Modeler	Federal Student Aid Target	Visual Modeling and Design Tool

Service Category	Service Standard	Federal Student Aid Service Specification	Federal Student Aid Classification	Comment
	Software Configuration Management	IBM Rational ClearQuest,	Federal Student Aid Standard	Change Management / Defect Tracking / Issue Management
		IBM Websphere Deployment Manager	Federal Student Aid Standard	Deployment Management
		IBM Rational RequisitePro, SODA,	Federal Student Aid Standard	Requirements Management and Traceability
		IBM Rational ClearCase	Federal Student Aid Standard	Version Control
		CVS	Federal Student Aid Contained	
		CCC/Harvest	Federal Student Aid Contained	
		Endeavor	Federal Student Aid Contained	
		Microsoft Office	ED Standard	Task Management
		WinZip	ED Standard	Task Management
	Test Management	IBM Rational Test Manager	Federal Student Aid Standard	Functional Testing Installation Testing Reliability Testing Security and Access Control Testing Usability Testing (508 Testing) Performance Testing Unit Testing

Appendix A   Acronyms

Table A-1 Acronyms Listing

Acronym	Definition
APP	Annual Performance Plan
AWG	Architecture Working Group
BTIG	Business and Technology Integration Group
CCB	Change Control Board
CDA	Common Data Architecture
CDDTS	Conditional Disability Discharge Tracking System
CFO	Chief Financial Officer
CIO	Chief Information Officer
CM	Configuration Manager / Change Management
CMO	Case Management & Oversight
COD	Common Origination and Disbursement
COOL	College Opportunities Online
COR	Contracting Officer's Representative
CPIC	Capital Planning and Investment Control
CPS	Central Processing System
CR	Change Request
CSB	Common Services for Borrowers
CSR	Customer Services Representative
DL	Direct Loan
DLCS	Direct Loan Consolidation System
DLSS	Direct Loan Servicing System
DMCS	Debt Management and Collection System
DS	Data Services
DUNS	Data Universal Numbering System
EA	Enterprise Architecture
EAI	Enterprise Application Integration
ESB	Enterprise Service Bus
EBF	Enterprise Business Function

Acronym	Definition
ECB	Electronic Campus Based
ECDM	Enterprise Conceptual Data Model
ED	U.S. Department of Education
EDCAPS	ED Consolidated Accounting & Payment System
EDD	Enterprise Data Dictionary
EIPM	Enterprise Integration Planning and Management
ESP	Enterprise Sequencing Plan
EVM	Earned Value Management
EJB	Enterprise Java Bean
FAA	Financial Aid Advisors
FAFSA	Free Application for Federal Student Aid
FACH	Federal Audit Clearinghouse
FEA	Federal Enterprise Architecture
FFEL	Federal Family Education Loan
FMS	Financial Management System (FSA)
FMSS	Financial Management System Software (ED)
FOIA	Freedom of Information Act
FP	Financial Partner
FPDM	Financial Partner Data Mart
FPO	Financial Partners Oversight
FPS	Financial Partner Services
FSA	Office of Federal Student Aid
FSC	Federal School Code
FSEOG	Federal Supplemental Educational Opportunity Grant
FWS	Federal Work Study
GAO	General Accounting Office
GA	Guaranty Agency
GAPS	Grant Administration and Payment System
GPRA	Government Performance and Results Act
GSA	General Services Administration
GSS	General Support System

Acronym	Definition
IA	Information Assurance
IF	Information Framework
ILSC	Integration Leadership Support Contractor
IFAP	Information for Financial Aid Professionals
IMS	Integrated Master Schedule
IPC	Investment Planning Council
IPEDS	Integrated Post Secondary Education Data System
IPM	Integrated Partner Management
IT	Information Technology
ITIL	Information Technology Infrastructure Library
ITIM	IT Investment Management
J2EE	Standard Java Environment Specification
JMS	Java Messaging Service
JSF	Java Server Faces
LaRS (aka LAP/LaRS)	Lender Reporting Systems/Lender Application Process
LEAP/SLEAP	Leveraging Education Assistance Partnership/ Special Leveraging Education Assistance Partnership
LID	Lender ID
LDAP	Lightweight Directory Access Protocol
LS&T	Limit Suspend and Terminate
MA	Major Application
MVC	Model-View-Controller
NSLDS	National Student Loan Data System
O&M	Operations & Maintenance (Vendor)
OCFO/FMSS	Office of the Chief Financial Officer
OHA	Office of Hearing and Appeals
OIG	Office of the Inspector General
O11ie	Oracle 11i Implementation Environment
OMB	Office of Management and Budget
OPE	Office of Postsecondary Education
OPEID	Office of Postsecondary Education ID

Acronym	Definition
PBO	Performance Based Organization
PCA	Private Collection Agency
PEPS	Postsecondary Education Participant System
PIP	Performance Improvement Procedures
PMO	Program Management Office
POJO	Plain Old Java Object
PP&E	Partner Participation and Enrollment
QA	Quality Assurance
RID	Routing ID
RM	Risk Management
RMT	Risk Management Team
SA	Security Architecture
SAIG	Student Aid Internet Gateway
SEC	School Eligibility Channel
SME	Subject Matter Expert
SOAP	Simple Object Access Protocol
SSA	Social Security Administration
SSN	Social Security Number
TAM	Tivoli Access Manager
TIM	Tivoli Identity Manager
TIN	Tax ID Number
USPS	United States Postal Service
V & V	Verification and Validation
VDC	Virtual Data Center
VIDM	Virtual Integration Data Mapping
WBS	Work Breakdown Structure
WCM	Web Content Management
XML	eXtensible Markup Language

Appendix B   Glossary

Table B-1 Glossary

Term	Definition
508 Compliance	A section of the Rehabilitation Act that requires compliance with the Electronic and Information Technology Accessibility Standards.
Business Area	The office or offices within the Department responsible for managing an IT solution and whose purpose will be to support that business function.
Capital Planning and Investment Control (CPIC)	This process is an integrated approach to managing Information Technology (IT) investments.
Certification and Accreditation (C&A)	This activity entails a comprehensive analysis of the technical and non-technical security features and other safeguards of an IT solution to establish the extent to which a particular solution meets a set of specified security requirements.
Change Management	Process for managing changes to configuration items (see ITIL)
Clinger-Cohen Act	This public law is formerly known as the Information Technology Management Reform Act or ITMRA. It requires each agency to undertake capital planning and investment control by establishing a process for maximizing the value and assessing and managing risks of IT acquisitions of the executive agency.
Configuration Mgmt	Management of collections of hardware, software or other entities belonging to well-defined sets or configurations (see ITIL)
Contract Office	Departmental offices that review and approve acquisition-planning documents.
Core Deliverable	A document that must be completed and approved by the end of a particular stage.
E-Government Act of 2002	This public law requires agencies to develop performance measures for implementing e-government. In addition, the act requires agencies to conduct and submit to OMB, Privacy Impact Assessments (PIAs) for all new IT investments administering information in identifiable form collected from or about members of the public. (Refer to the CPIC process for more information).

Term	Definition
Enterprise Architecture (EA)	This functional area provides resources and processes to help the Department link its business needs with the best available technologies. EA helps the Department accomplish more with existing resources by using common or shared technology features to deliver needed capabilities faster, reduce new technology risks and free key program staff to focus on more important work.
Exhibit 300	Funding request document describing the business case for an investment, financials, performance measures, SRM and TRM mappings.
Exit/Entry Criteria	The required Framework deliverables that must be completed and approved to exit one stage and enter the next.
Family Educational Rights and Privacy Act (FERPA)	A Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.
Federal Information Security Management Act (FISMA) of 2002	Federal legislation that requires agencies to integrate IT security into their capital planning and enterprise architecture processes at the agency, conduct annual IT security reviews of all programs and systems and report the results of those reviews to OMB.
Framework	A structured approach of required stages, key activities and core deliverables that provides a foundation for aligning existing interrelated processes within the Department-regardless of system lifecycle methodology employed.
General Support System (GSS)	Interconnected information resources under the same direct management control that shares common functionality. A system normally includes hardware, software, information, data, applications, communications, facilities and people. It provides support for a variety of users or applications, or both.
Information Assurance (IA)	The continuous application of security policies, procedures and processes that protect and defend information and information resources from unauthorized disclosure, modification or denial of services to authorized consumers.
Information Technology (IT)	A term used to describe equipment or an interconnected system or subsystem of equipment, which is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data by an executive agency.

Term	Definition
Information Technology Investment Management (ITIM)	A process area within the Department that provides an integrated management mechanism for the continuous selection, control and evaluation of investments in information systems and resources over the course of their lifecycles. (Refer to the Department's ITIM Process Guide for more information).
Integrated Technical Architecture (ITA)	Infrastructure that will reduce the number of stove piped applications within FSA that are costly to update. FSA applications use this infrastructure to reduce performance bottlenecks and resolve issues.
Key Activity	Any task, procedure or process that enables and supports the development and/or approval of a core deliverable (see definition for core deliverable above).
Key Component	Critical documents, sections of documents or categories of information that pertain to a core deliverable.
Lifecycle Management (LCM)	The coordination of activities associated with the implementation of information systems from conception through disposal, which include defining requirements, designing, building, testing, implementing and disposing of systems.
Major Application	An application that requires special attention to security due to the risk and magnitude of the harm resulting from the loss, misuse, or unauthorized access to, or modification of, the information processed by the application.
National Institute for Standards and Technology (NIST)	This organization is a non-regulatory Federal agency within the U.S. Commerce Department's Technology Administration division. NIST's mission is to develop and promote measurement, standards and technology to enhance productivity, facilitate trade and improve the quality of life.
OMB Circular A-11	The title of this legislation is "Preparing, Submitting and Executing the Budget." A-11 provides guidance on preparing the Fiscal Year Budget submissions for Presidential review and includes instructions on budget execution.
OMB Circular A-123	The revised version of this policy will have the title, "Management's Responsibility for Internal Control," and is effective as of FY 2006. This legislation defines management's responsibility for internal control in Federal agencies and has a strong emphasis on financial reporting, as opposed to IT Capital Planning.

Term	Definition
OMB Circular A-130	The title of this policy is "Management of Federal Information Resources," A-130, provides information resource management policies on Federal Information Management/Information Technology (IM/IT) resources. The ED OCIO recommends that all offices investing in IT resources become familiar with OMB A-130.
OMB Circular A-94	The title of this policy is "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs." A-94 offers guidelines to promote efficient resource allocation through well-informed decision-making.
Paperwork Reduction Act of 1995	Federal legislation intended to minimize the paperwork burden resulting from the collection of information by or for the Federal government in an effort to reduce cost by better managing Federal government information.
Personalization	Delivery of specific services, content or data keyed to user attributes
Planning and Investment Review Working Group (PIRWG)	Department governing body that conducts IT investment analysis reviews and evaluates IT investments and makes recommendations to the CIO. The PIRWG also advises the CIO on Strategic IT investment management issues.
Portal	Portal server subsystem that delivers basic portal services
Portlet	Portal application component (often one of several on one page)
Portlet API	Portal application program interface for portlet manipulation
Principal Office (PO)	Offices within the Department that are responsible for ensuring that they develop automated systems that use information technology in accordance with the Framework.
Privacy Act of 1974, as amended	All Department IT systems processing data that is protected under the Privacy Act must have measures implemented to protect individually identifiable information. Interconnecting systems owned by other departments and agencies that process Department data must also be considered. Protection measures must consist of management, technical and operational controls and ensure an acceptable level of risk. An acceptable level of risk should be determined in accordance with the Department's Risk Management Procedures.
Problem Resolution	Resolution of known errors

Term	Definition
Process Guides	Documents for various process areas within the Department (e.g. ITIM, TRB, CCRB).
Profile Management	Function to manage portal user profile storage and access
Project Manager	Staff person who is responsible for creating deliverables and ensuring that business and technical reviews are executed and required deliverables are completed. This individual is also responsible for managing the day-to-day operations of the Department's IT solutions.
Quality Assurance (QA)	A discipline within project management to objectively monitor control and ensure the completion of key activities and required core deliverables throughout the lifecycle.
Solution	A term to describe all automated information systems, software applications and manual processes at the Department (see System below).
Source Code	Computer application as written in its source language, e.g. Java
Stage	Definitive sections of the lifecycle that indicate a specific purpose or goal (e.g. Vision Stage, Design Stage). The end of each stage is marked by a "stage gate," which marks the exit from one stage and entry into the next.
Stage Gate Review	The integration of various business and technical reviews that ensures core deliverables (and any additional deliverables) required for that stage have been completed.
System	A collection of components (hardware, software, interfaces) organized to accomplish a specific function or set of functions; generally considered to be a self-sufficient item in its intended operational use.
Tailored Project Guide	A document program and project managers use to plan, record and track the completion of all deliverables required for a solution. Project managers should list all Framework core deliverables and any additional required deliverables for their solution.
Technical Review Board (TRB)	Department governing body whose purpose is to govern the technical aspects of new systems development that might affect the performance of the many client and enterprise systems, infrastructure, data and general integrity of the Department's network (EDNet).

Term	Definition
User	An individual or organization operating or interacting directly with the system; one who uses the services of a system.
Web Services	Web services that connect Internet users or other Internet-based applications.
Work Products Guide	The Work Products Guide seeks to provide project managers with access to a knowledge base of guidelines, procedures, and templates for all critical project activities.

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